

REMARKSI. The 35 U.S.C. §102 Rejections over NICKEL

Claims 1, 9-10, 15-19, 22, 28-29 and 33-34 were rejected under 35 U.S.C. §102(a) as being anticipated by U.S. Patent No. 6,603,678, issued to Nickel et al. ("NICKEL"). Applicant respectfully traverses the rejections.

A. Overview

NICKEL discloses thermally-assisted switching of magnetic memory elements. In NICKEL, each magnetic memory element to be switched is selected by a word line and a bit line. NICKEL, col. 1, lines 25-27 and col. 3, lines 60-61. "The memory element at the crosspoint of the selected word and bit lines is exposed to the combined magnetic field ( $H_x + H_y$ ). This selected memory element is also heated by the selected heating line." NICKEL, col. 4, lines 24-31 (emphasis added). Application of heat allows the memory element to "switch more reliably in the presence of the combined magnetic field ( $H_x + H_y$ )." NICKEL, col. 3, lines 19-21 (emphasis added).

B. Claim 1

It is axiomatic that the cited reference in a §102 rejection must disclose every element in the rejected claim. Claim 1 recites:

An array of thermally-assisted magnetic memory structures,  
each of said magnetic memory structures comprising:

- a memory cell;
- a write conductor contacting said memory cell, said write conductor selecting said memory cell in a first coordinate during a write operation; and
- a heating system contacting said memory cell, said heating system:

- heating said memory cell during said write operation;  
and
- selecting said memory cell by said heating in a second coordinate.

Based on the arguments presented below, Applicant respectfully submits that NICKEL does not disclose or suggest at least one limitation of claim 1.

1. NICKEL Does Not Disclose or Suggest Selecting the Memory Cell by Heat in a Second Coordinate

Claim 1 recites the steps of selecting a memory cell in a first coordinate by a write conductor and selecting the memory cell in a second coordinate by heat.

Conventionally, memory cells are located at cross-points of word lines and bit lines. Selection of a memory cell is typically accomplished by passing currents through selected word line and bit line, where the memory cell is situated at the cross point of the selected lines. Word lines and bit lines are generally made of metal. Metal dissipates heat quickly. Thus, excessive metal contact is undesirable in thermally-assisted memory structures. Claim 1 recites a method that effectively enables a selection of a memory cell by a combination of one write conductor and heat (i.e., eliminating the need of a second conductor to select a memory cell).

In contrast, NICKEL discloses conventional magnetic memory structures in which each memory cell is generally selected by at least two metal conductors (i.e., both word and bit lines). NICKEL, col. 4, lines 24-26.

Based on the foregoing, NICKEL fails to disclose or suggest at least one limitation recited in claim 1. Therefore, claim 1 should be in condition for allowance.

C. Claims 2-16

Claims 2-16 are dependent on claim 1. Based on the foregoing arguments for claim 1, Applicant respectfully submits that NICKEL does not anticipate claims 2-16 and these claims are also in condition for allowance.

D. Claim 17

Corresponding elements of independent claim 17 recite similar limitations (i.e., applying a write current through a single write conductor to switch a memory cell) as discussed above with respect to claim 1. Based on the foregoing arguments for claim 1, Applicant respectfully submits that NICKEL does not anticipate claim 17 and claim 17 is also in condition for allowance.

E. Claims 18-21

Claims 18-21 are dependent on claim 17. Based on the foregoing arguments for claim 17, Applicant respectfully submits that NICKEL does not anticipate claims 18-21 and these claims are also in condition for allowance.

F. Claim 22

Corresponding elements of independent claim 22 recite similar limitations as discussed above with respect to claim 1. Based on the foregoing arguments for claim 1, Applicant respectfully submits that NICKEL does not anticipate claim 22 and claim 22 is also in condition for allowance.

G. Claims 23-33

Claims 23-33 are dependent on claim 22. Based on the foregoing arguments for claim 22, Applicant respectfully submits that NICKEL does not anticipate claims 23-33 and these claims are also in condition for allowance.

H. Claim 34

Corresponding elements of independent claim 34 recite similar limitations as discussed above with respect to claim 1. Based on the foregoing arguments for claim 1, Applicant respectfully submits that NICKEL does not anticipate claim 34 and claim 34 is also in condition for allowance.

## II. The 35 U.S.C. §102 Rejections over ABRAHAM

Claims 1, 4, 9-19, 22, 25, 28-34 were rejected under 35 U.S.C. §102(e) as being anticipated by U.S. Patent No. 6,385,082, issued to Abraham ("ABRAHAM"). Applicant respectfully traverses the rejections.

### A. Claim 1

Claim 1 recites the steps of selecting a memory cell in a first coordinate by a write conductor and selecting the memory cell in a second coordinate by heat.

Similar to NICKEL, ABRAHAM discloses conventional memory structures in which each memory cell is selected by a word line and a bit line. ABRAHAM, col. 4, lines 63-65.

During memory array operation, when a sufficiently large current is passed through both a word line and a bit line of the MRAM cell, the self-field generated by the combined current at the intersection of the word and bit lines will rotate the magnetization of the free layer of the single particular cell located at the intersection of the energized word and bit lines.

ABRAHAM, col. 5, lines 33-39 (emphasis added).

"A brief pulse of write current is applied by voltage source to heat the ... selected cell." ABRAHAM, col. 5, lines 50-54. In ABRAHAM, heat is being applied to assist the switching of a memory cell previously selected by a word line and a bit line. In contrast, claim 1 recites selecting a memory cell by a write conductor in a first coordinate and selecting the memory cell by heat in a second coordinate. Thus, ABRAHAM fails to disclose or suggest at least one limitation recited in claim 1. Therefore, claim 1 should be in condition for allowance.

B. Claims 2-16

Claims 2-16 are dependent on claim 1. Based on the foregoing arguments for claim 1, Applicant respectfully submits that ABRAHAM does not anticipate claims 2-16 and these claims are also in condition for allowance.

C. Claim 17

Corresponding elements of independent claim 17 recite similar limitations as discussed above with respect to claim 1. Based on the foregoing arguments for claim 1, Applicant respectfully submits that ABRAHAM does not anticipate claim 17 and claim 17 is also in condition for allowance.

D. Claims 18-21

Claims 18-21 are dependent on claim 17. Based on the foregoing arguments for claim 17, Applicant respectfully submits that ABRAHAM does not anticipate claims 18-21 and these claims are also in condition for allowance.

E. Claim 22

Corresponding elements of independent claim 22 recite similar limitations as discussed above with respect to claim 1. Based on the foregoing arguments for claim 1, Applicant respectfully submits that ABRAHAM does not anticipate claim 22 and claim 22 is also in condition for allowance.

F. Claims 23-33

Claims 23-33 are dependent on claim 22. Based on the foregoing arguments for claim 22, Applicant respectfully submits that ABRAHAM does not anticipate claims 23-33 and these claims are also in condition for allowance.

G. Claim 34

Corresponding elements of independent claim 34 recite similar limitations as discussed above with respect to claim 1. Based on the foregoing arguments for claim 1, Applicant respectfully submits that ABRAHAM does not anticipate claim 34 and claim 34 is also in condition for allowance.

III. Allowable Subject Matter


Claims 2-3, 5-8, 20-21, 23-24, 26-27 were objected to as being dependent upon a rejected base claim. Based on the foregoing regarding the respective base claims, Applicant respectfully submits that these claims are now in condition for allowance.

IV. Conclusion

In view of the foregoing, it is respectfully submitted that the application is now in condition for allowance. Should the Examiner believe that a telephone interview would help advance the prosecution of this case, the Examiner is requested to contact the undersigned attorney.

Respectfully submitted,

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